Notebook Series -- Notebooks by Edison and Other Experimenters
Navy and Wartime Research Experiments
Notebook, N-17-08-25.1

This notebook was used during the periods August-September 1917 and March-April 1918 by Edison, Henry G. Wolfe, and several other experimenters for notes pertaining to Edison's work for the U.S. Navy during World War I. At the beginning of the book are entries by Wolfe and an unidentified experimenter relating to experimental work on the water kite or kite rudder at Sag Harbor, New York, and others areas along the Atlantic coast. There are also notes by Wolfe regarding tests of decoy smoke screen pots. Other entries by Wolfe describe a series of camouflage experiments using colored paint conducted during September 1917 near Gardiners Point in Long Island Sound. Also included are notes by an unidentified experimenter on torpedo detection experiments in March 1918. The remaining entries from 1918 pertain to sound detection experiments by Edison, Wolfe, and two unidentified experimenters at Key West, Florida. Some of this work was done aboard the USS *Sachem.* Included is an 11-page note by Edison from March 30, which is the only extensive Edison entry in the book. The pages are unnumbered. Approximately 90 pages have been used. Several loose pages have been inserted into the book, and at least one page has been removed.

35428
Acme Co.,
MFG. STATIONERS,
96 JOHN ST.
AND
19 PLATT ST.
NEW YORK.

Coffin

$P = 1.51\, A V^2$

Water Kite

$$P = \frac{D}{g} K A V^2$$

$A = \pi$

$V = \text{Vel}'/\text{sec}$

$K = .90$

D = density, γ sort water $= 64\#$?

fore + aft middle-line plane or submerged sec.

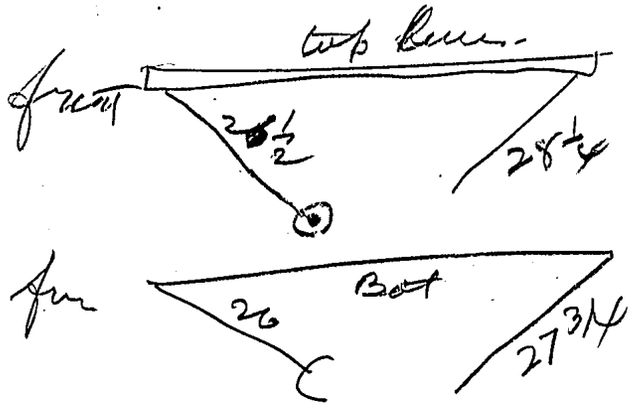
$R = \frac{1}{40}$ to $\frac{1}{50}$ in battle ships

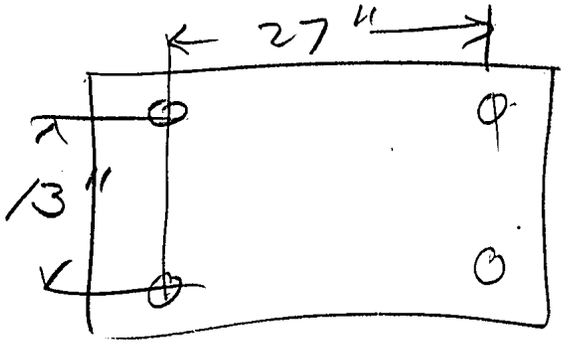
$\frac{1}{50}$ to $\frac{1}{60}$ merchant steamers

21" dia. 21 ft lg
2 propellers. 4 blade. 1200 RPM
80 HP Turbine; ~~5000~~ 1000 RPM
Range 12500 yds.
27 knots — Continental
30 knots 10000
Variable of 2 knots;
2 mp knots.
2800# air Pres.
32 pints alcohol 52 gal. water
Head - air cooled
alcohol - water
mtrl Temp 600°F from 500°F
rise / knots. weight

Aug 25

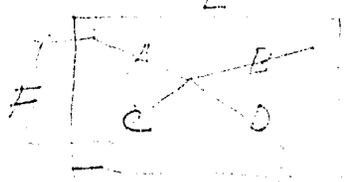
Kite Rudder





Aug 26-18

E



Rope length F 15 2"

E

C 16 1/8

A 15 3/8"

B 18 3/8"

D 17

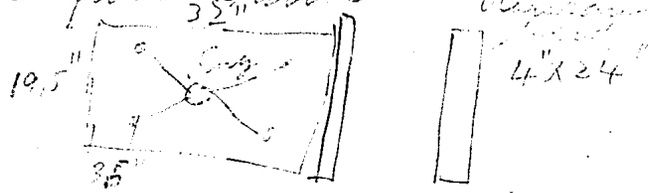
2 5

2 4-1

	I	II	III
Forward			to midship ring
A	14		18"
B	20		21 1/4
C	13		17"
D	18.5		21 1/4
E			22.25
F			15.5 — 16
			Forward Stern

Case I — Lines

Case III Paddle mill [illegible] based on scan for resistance



Acted OK, slight roll [illegible] wing wheel aft [illegible] stay under water. [illegible] dive. Resin refes above at ring Astrame

21"
24'

weighted a little forward
Did not sink.

Aug 26-

Dimension

A

B

C

D

E

E

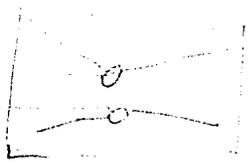
Same as last test.

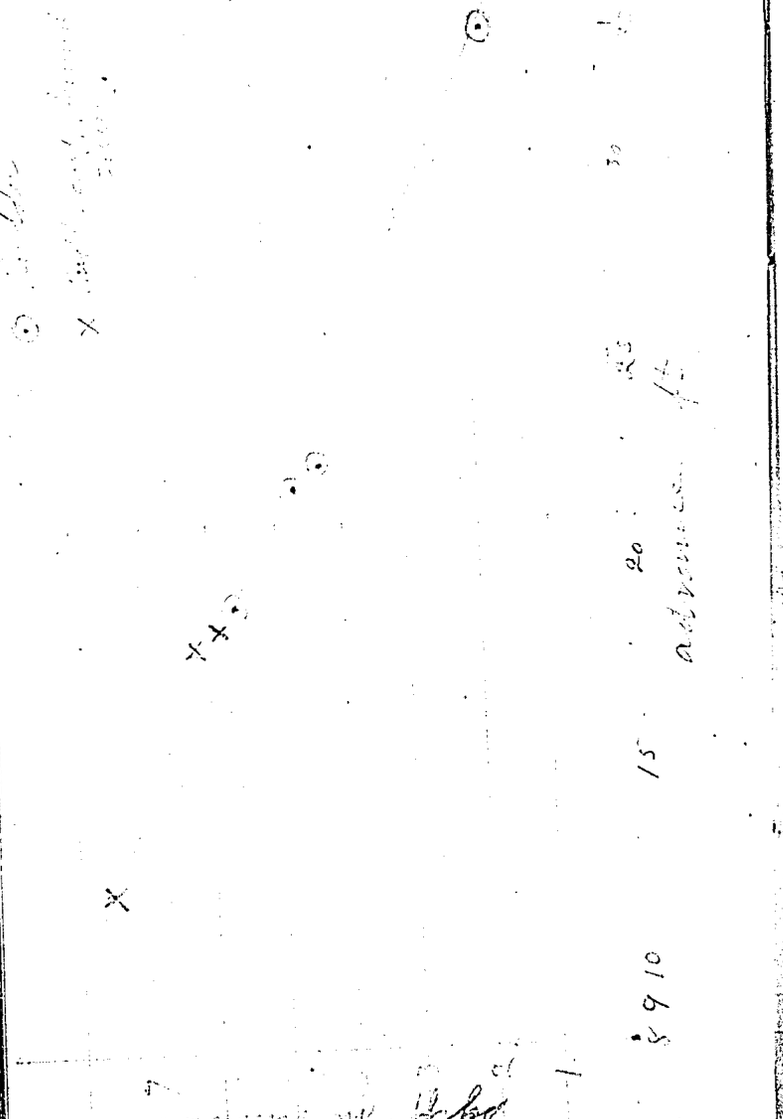
	advance
with tiller	15
and full rudder	[illegible]
tiller alone	35'

C	13.5
D	20.5

with two bad rudders. Advance

alone, 32



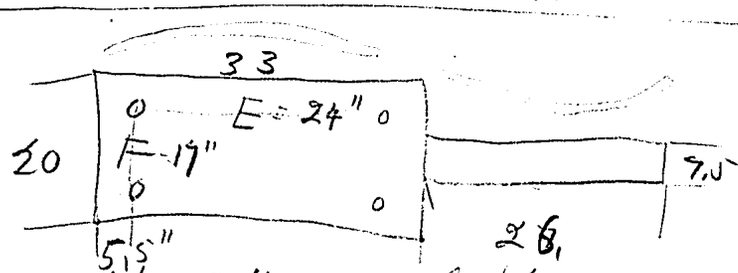


Advance

[illegible]	[illegible]	Kile alone 22.5	Kile 15.5'
[illegible]	5.65	10'	12'
[illegible]	[illegible]	[illegible]	16.25' only 33'
	1.8		

Advance Cartridge

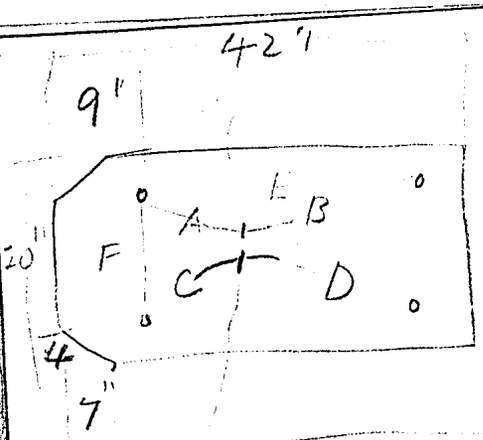
	Dimensions.
C	13.5
D	18.25



Capt Potter Barrel Stowes

	Advance
Kile Rudder alone	33
With Fillet & Kile	23
	16.5
With Fillet only	31.5
	35.0

Advance taken from fore-foot low water boat [illegible] 90°.



Ref.
A 22 3/4
B 29 1/4
C 27.5
D 33.5

E 26.5
F 13.5

length C = 27"
D = 28 1/2

Large Kite Rudder

	Advance
With Kite and tiller	12.5'
"	11'
Kite Rudder only	18'
Same Spec	20'
Capt Pattens Barrell Stare	
Kite Rudder and tiller	22
" " " "	20.5
~~Rudder~~ Kite only	28
	29

Length of line - 15 ft

Capt Patten Board Steam

Dimensions
A - 30
B - 28
C - 29.5
D - 28

Side Paddle wheel 22'
Rule & Siller 18.5'
" " " 18'

Some Where on the Atlantic

Capt Potters

Sq rig sloop rig
- steam ship -

Capt Potter tried out scheme of decoy smoke pots to move before wind

Used slab of wood for hull - broom stick for mast chum cloth for sq sail - chunk of tin can for smoke stack - old bolt for ballast, + piece of 1 x 4 scrap wood for rudder -

Used oily waste for fuel -

After three or four trial trips - he succeeded starting off on a perfectly successful cruise before the wind.

Trial trip made in Gardeners Bay Aug 27 - 1917

Mr Edison - approved.

Took five men in a dory to start her on her Maiden Voage. (21)

Kite Rudder

Tentative design for
400 ft fgt ship

Speed 10 Knots –
draft 25 ft

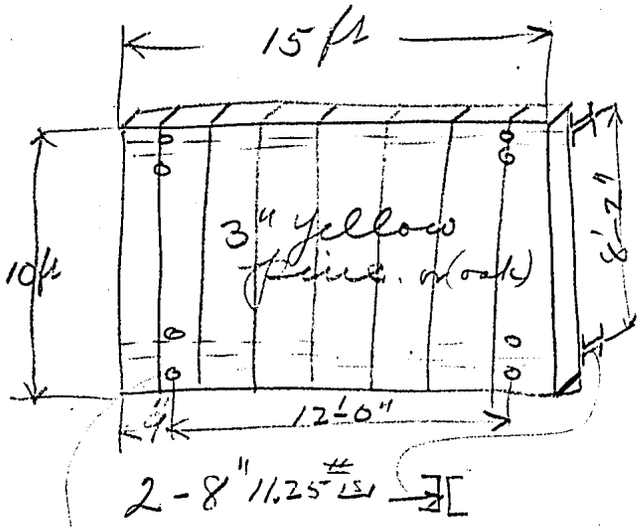
Area Rudder = $\frac{400 \times 25}{50}$ = 200 sq ft

~~Area~~ Area Kite Rudder 300 sq ft
Three 2 - 15 ft x 10 ft each
side – as one 10 x 30
Requires 2 - 5" dia Cables

See Sketch

Next page

Max pres ~~[illegible]~~ = 75000 lbs
on 10 x 15 K Rudder
Normal pres = 50000 lbs



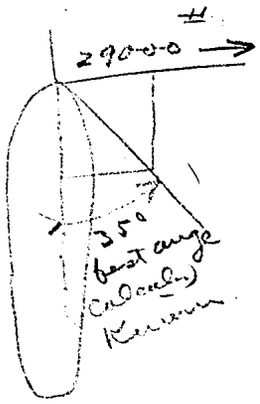
holes through [illegible] for 1" dia steel rope
– Bridle –

2 - 3" dia hawsers
for lead rope.

Some Where on
the Atlantic Coast

~~[illegible]~~

over



Wgt of Stice	675
	1425
	2100
+ 5%	105
Total	2205

Bouyancy of Wood	975 #
Wgt of Stice in H_2O	580 #
Positive Buoyan =	395 #

6

2.334436
.97
16327066
21001942
2.263416.86

183.6

215
.00634

.02 lbs per sq in

147
2.94 lbs

3 lbs compressed per sq ft

60
180 lbs/min

.00634
× 183.6
3836
7502
5504
1162.756

147 holes .020 dia.

.7854 × .02² =
.7854
.0001
.7854
31632
.00634174

.00634 sq in area each orifice

Adjusted form

$F_{piece} = \frac{a_0 P_1^{.97}}{60}$ per $F_{min} = aP^{.97}$

F = lbs of steam per min
P = absolute pressure
a = area of orifice

$F = \frac{.00634 \times 215^{.97}}{60} = \frac{.00634 \times 183.6 \times 60}{60}$

= 1.163 lbs/min/orifice

~~HP~~

1.163
147
8141
4652
1163
270.961

33) 270.961

33) 271 lbs/min

~~8 HP~~

$\frac{271 \times 60}{33} =$ 542 HP each pulverizer

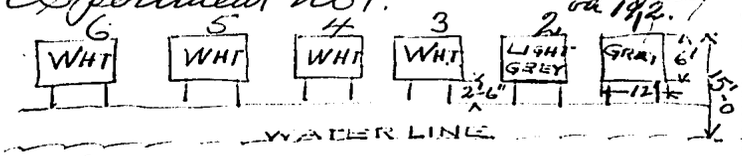
Camouflage (Colored Paint)

Fort Ruins off Gardeners Point.

Sept X 11th 1917.

Experiment No 1.

Same as light house on 1/2.



Very light white clouds along sky line, clear blue sky above.

Height of Eye above water line
Sitting — 4'-8"
Standing 9'-0"

TIME.	STAT. MILES	HEIGHT of Eye	Observer reg by	REMARKS.
1-41-10	0.	4'-8"	EYE	STARTED (FROM SHORE)
1-41-50		"	"	up to speed.
1-43.00	.236	"	"	No 1 Least Visable.
1-53-25	1.59	"	"	1+2 appear to be round + smaller others square + strongly visable.
1.53-25	1.59	"	GLASS	1+2 square, no 1 faintest and getting nearer to color of skyline.

TIME	miles	height	observed by	REMARKS.
1-56-30	2.99	4'-8"	Eye. + glass	Strong reflection of white ones on the water — a shade reflection of no 2 - none of no 1. Cant see Sand.
2-00-00	2.46	4'-8"	Eye or glasses	Object + reflection run together and makes objects 1-6 look twice as large ✓
2-03.40	2.91	4'-8"	Eye	No 1 nearly gone.
2-04.40	3.04	4'-8"	GLASSES	Reflection + object blend together making making objects look 3 + 4 times higher 192 HULL DOWN.
~~2-50~~				
2-05-50	3.20	4'-8	Eye	No 1 gone
2-07-00	3.34	4'-8	glasses	No 2 gone.
2-08.00	3.47	4'-8		No 3, 4, 5 + 6 come + go due to mirage effect on water — like heat waves over a hot stove.

TIME.	stat. miles	height	observed by	REMARKS
2-09-30	3.66	4'-8"	GLASSES	ALL GONE.
2-10-40	3.69	10'-0" standing in cabin	Eye.	Can see all - No 1 very faintly Reflec, makes objects appear 2 or 3 times higher
2-12-10	4.03	10'-0	Eye.	No 1 gone.
2-14-00	4.25	10'-0	Eye	No 2 gone
2-15-20	4.45	10'-0	glass	No 1 flickering badly
~~2-16-50~~				
2-17-05	4.65	" "	glass	No 1 gone
2-17-30	4.70	" "	glass	" 2 gone
2-17-45	4.74	" "	"	3-4-5-6 flickering badly
2-18-05	4.77	" "	Eye	3-5-6 gone.
2-18-35	4.85	" "	glass	all gone.
2-19-10				turned about

Note:
Violets were composed of Red-Blue + White Paint mixed.

Camouflage (Paint)
Fort Ruins off Gardeners Island
Sept 12 1917

Exp. No 2.

6	5	4	3	2	1
4" RED 1" YEL Vert Stripe	4½ RED ½ YEL Vert Stripe	DARKER VIOLET	LIGHT VIOLET	White	Same as Sep + 11

water line

Glassy Sea + flush sky line
very thin clouds (cirrus stratus) some times over sun

TIME	STAT MILES	HEIGHT	observed by	Remarks
1-09.30	.4	4'-8"	GLASS	Started from ship 700 yds from ship. 1,6,3,4,5,2 Visability least visable given 1st in all cases.
1-14.55	1.10	4'-8"	Eye	1-4-3-6 5-2. Visability
1-20.55	1.88	4-8"	Eye	1 4 3 6 5 2 " no 1 scarcely seen
1-22.45	2.12	4'-8	Eye	THIN Cloud over sun 1 4 3 6 5 2 Visability
1-26.30	2.6	" "	"	gravel bank ~~[illegible]~~ ~~[illegible]~~ still Vis. sky line not up to board yet.

[35]

Time	Stat Miles	Height of Eye	observing with	Remarks.
1-27-35	2.74	4'-8	glass	commence to get Reflec.
1-27-50	2.84	" "	glass	Strong reflec. from No 2+5 - None from No 1
1-29-30	2.99	" "	glass	Strong reflec. can still see gravel bank Sun clear
1-32-00	3.39	" "	glass	Sun clear. Object + reflec. run together on #1-4 5+6. No so with 2+3.
1-39-30	4.28	" "	glass	No 1, 4 3 6 5 2 Visibly Sun clear getting some reflection yet.
1-41-30	4.54	" "	Eye	No 1 invisable
1-42-00	4.61	" "	Eye	5+6 invisable
1-42-30	4.67	" "	"	All invis. except No 2.
1-43-00	4.73	" "	glass	Only 2+3 Visable appear above skyline flickering -
1-43-30	4.80	" "	glass	All gone.
1-44-30	4.93	10'-0	glasses	No 1, 4, 3, 6, 5+2 Visabil Reflec. 2½ Times as high as wide.
1-46-45	4.94		Eye	No 1 gone

Time				
1-50-20	5.68	10'-0"	Eye	Only No 2 can be surely seen.
1-51.10	5.8	10'-0	glass	flickering — No 1 gone
1-52.00	5.9	" "	glass	only 2 + 3 flicker badly now + then
1-52.40	5.94	" "	glass	Can see only No 2 which flickers -
1-53.00	6.02	" "	glass	All gone.

Direction taken from target
South West By West ½ West

Camouflage
Ruins H Gardeners Point
Sept 18-1917

Ex J. No 3
No 1 — Gray
No 2 — 90% Black 10% white
No 3 — 80 20
No 4 — 70 30
No 5 — 60 40
No 6 — 50 50

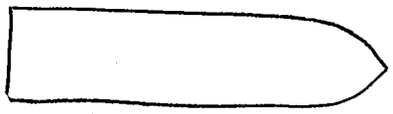
	Miles	height	observed with	Remarks
3-37.00	.4	4'-8"	Eye or gloss	Starline of boat No 2 Best.
3-40.00	1.19	" "	Eye.	No 2 Hazy
3-43-50	1.28	" "	eye	No 2 gone
3-46-25	1.62	" "	gloss	No 2 gone
3-46-30	1.63	10'-0"		Went on top of Cabin
3-48-10	1.85	" "	gloss	No 2 gone
3-52-40	2.42	" "	Eye	gravel bank plainly Vis.
3-56-30	2.92	" "	"	do. do.
3-56-45	2.93	" "	Eye	No 3 gone.
3-58-10	3.12	" "	" "	Still see gravel bank ~~No Reflection~~
4-00-30	3.42	" "	" "	See gravel
4-01-20	3.44	" "	" "	#4 gone

S.P. 192- got in range of view
Experiment. done -

Clear over head - very hazy
Sky line - light wind ~~moderate~~ sea

[41]

Olemm ~~[illegible]~~



Olemm = 2.
Wgt per gt; 4 lbs apx.

Use ½ lb. T.N.T. = 7 min –

Black powder Exp Charge –
Black powder fuse with fulminate cap
to set off T.N.T Charge –

Olemm unsef. com.

Olemm – ignites Black powder
" wick not ignite T.N.T.
" will explode fulminate of Mercury ?
forming fulminic acid.

.7854 × 2.375²

3/4
3/8
2 5/16 diam.

2.375
.0625
2.3125

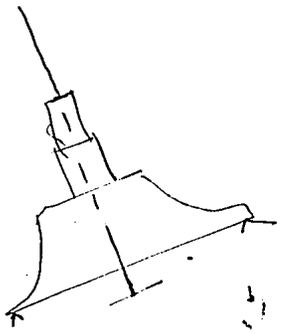
191 = 231 cu in / 4 = 58 cu in.

Inside diam Shell 2.375"
" Area. 4.4 sq in.

58 / 4.4 = 13.2" say 14 1/2" for Plenum Con.

Make Con 2 5/16 O.D. 1/16" Clearance.
.020 thick (lim)
Inside Diam Container = 2.3125"
Area = 4.2 sq in.
58 / 4.2 = 12 3/4" - allowing for fillet + bend.

Fuse 22 in in 56 sec. ? Kunim.
1/2 inch per sec



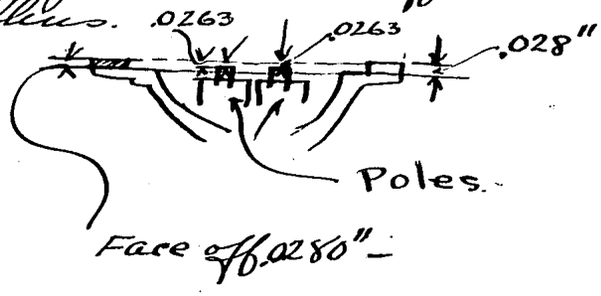
Mar 20th. am.

order no 5005

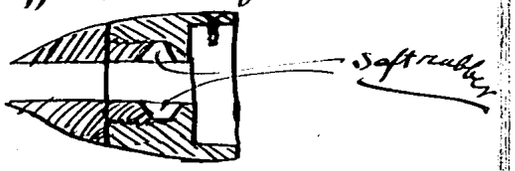
Starter, ~~Sub~~ Surface Detection Cf.

Mar 21-1917.

Decided to face off receiver & replace out cut off with rubber bushes.



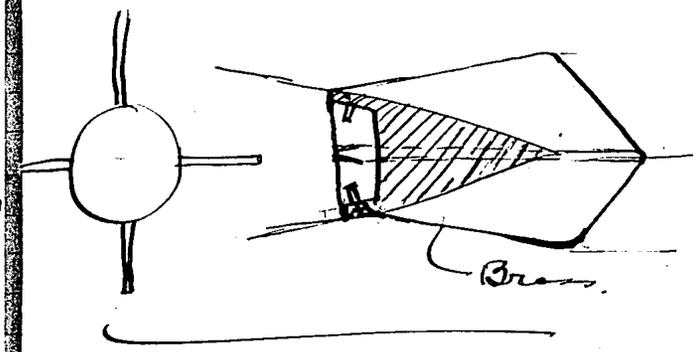
Make stuffing box for head of "fish"



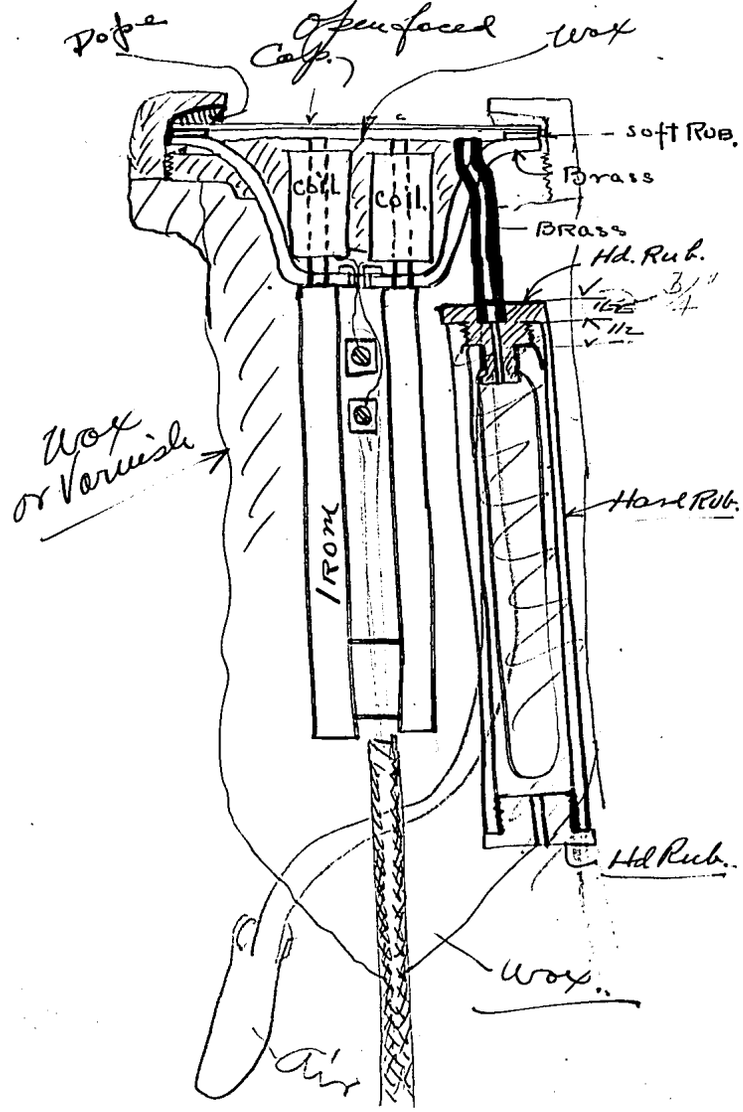
over

Nov 21st continued.

Making new tail fins, of board. (true & smooth)



March 21st Continued



Mar 21. Continued.

Must get fine polish
on all surface exposed to water.

Mar 22-

Mar 23

According to this — average

3 amp on filament
Sound lost at 31 points

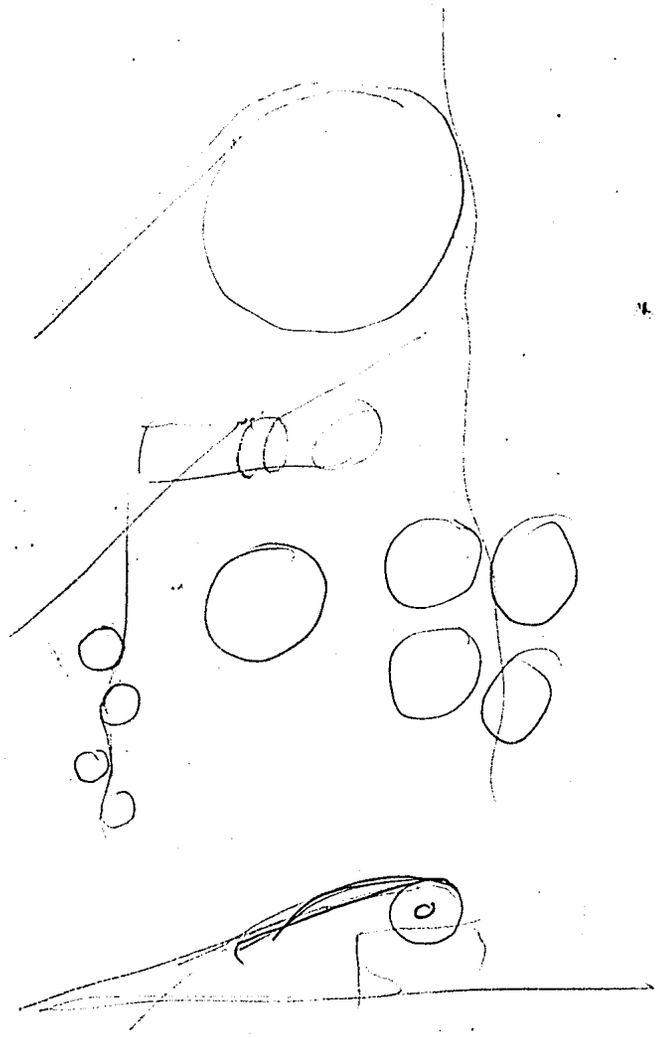
4 amp " 42 "

Key West Mar 27 '18

500 ohm receiver in fish - Solid receiver wire and receiver - 666 ω.
2-80 ohm receivers as listeners -
3 stage audion. Fish of mahogany polished and filled - linseed oil and shellac. Detail of construction see Mar 21 '18
200 ft Cable 7 knots
Resistance to ground 19,000,000 ω +
Start 1.30 P.M.

	Audion amps	Mono mark.	Marine wooden
200 ft 7 knots	4	48	48
	3	28	34
200 ft Cable 10 knots	4	48	44
	3	30	34 -
	Resistance OK.		
500 ft 10 knots	4	48	50
" "	3	34	32 -
	Resistance OK.		
1000 ft 10 knots	4	58+	56 +
	3	56 +	56
500 ft 10 kn	4	48	48
	3	34	30

2.45 P.M. Resistance dropped to 700,000.
Noticed Noise in and in step with r.p.m. of propeller both with cable



Protection of the armature.
Due to vibration of the armature?
Taken in at 8.30
resistance 700,000.

After [illegible]
Cables [illegible]
[illegible]

~~Cable [illegible]~~
~~Cable [illegible] 20 ft [illegible]~~

Cable - 100 ft [illegible] 400,000,
splice due not
Lack 20 ft of cable near fish
= 500,000 ohms.

Note. Propellers became electrically
at 500 ft [illegible]

Noises - louder at 1000 ft than
at 500 ft.
(500 ft left)

Keyport Nov 26

500 ohm receivers in fish
total resistance [illegible] = 556
2-50 ohm [illegible] receivers as
listeners.
3- Stage Amplifiers
Fish & Mahogany [illegible]
[illegible]

Resistance to ground. 5,000,000 ohms
Stat 245
Army Field Cable –

15 ft cable	Amplifier Amp	Receiver	Output
Loading Stiff –	4	4.	
200 ft.	4	46.	46 Very good & Clear
10 feet.	3	32	32
Resistance	5,000,000 ohms - V		

Checked
Voices heard well to screen.
Reading very good.
Reed Cable = 2 –

500 ft.	4	46	46
10 feet	3	30	32
Resistance	5,000,000 ohms V		
500 ft.	4	42	42
	3	22	22
Res. –	17,500,000.		

	amp.	R.	W
500 ft.	4	44	50.
~~Main Stay~~, Eng Stopped (and under Reconnection)			

Resistance 1,400,000 ohms.

Reason noise is louder is because ear is more sensitive as Microm audion room are less

Tail 50 ft. Rub. Cov. Cable

		R.	W
500 ft.	4	56	56 ✓
10 Knots.	3	38.	40 ✓

Resistance, 100,000 ohms.
Antenna. 6.

Eng. Stopped 4 48

Out Rigger off

Resist 100,000 ohms

		R.	W
500 ft	4	46	46
10 Knots	3	—	36
(Stopped) Reconnection	4	47	—

Out rigger Force.

Resistance 70,000 ohm

10 knot	Amp.	K	00.
500 ft.	4	50	52
	3	36	36

at rest	Amperes		Resist.
500 ft.	4		

Resistance Measurement

Cable overboard

feet	Resistance
550	70,000
500	90,000
450	"
400	"
350	"
300	"
250	"
200	"
150	"
100	"
50	"
fish only	90,000
Receiver and fish in water	45,000
Receiver only in water.	10,000,000 +

taken out of fish

Mar 28

Key West Mar 28-1918

550 ft of cable total 3 stage audion.

500 ft Cable - 10 knots

500 above reservoir fish [illegible]

Resistance 5,000,000 Ω

	Audion	Noise
500 ft - 10 knots cable pulled by reel	4	5 6
Engine stopped slowly under momentum	4	5 6
Resistance to ground 5,000,000 Ω		
with Cable pulled by Cotton rope.	4	5 6
same as above but 50 ft of cable lying on deck removed from reel	4	5 6

No change when cable was reeled up from deck.

Boat stopped Audion tanks Value 4 noise

Fish - 30 ft deep. Noise Value 18

Above tests conducted with everyone on board quiet and all auxiliaries stopped.

With fish being pulled up and down a few feet noise is heard as fish moves

C713

This noise has same character as noise heard while towing.

Ship stopped, aud 4 amp
Noise value of audion 6
Fish 300 ft deep
(4 amps) Noise value = 5
Locality near Key West about 3 miles.

4 knots – 500 ft. 10 knots.	Aud. 4 amps	Noise 48
10 knots 100 ft.	4	42
6 knots.	4	44
Ship Stopped	Aud value 6 4 amps	26 on bottom 18 pulling up
last of slack on bottom.	4	56 + probably moving on bottom.
as anchor last of slack came on bottom	4	18
	Aud. value 6	

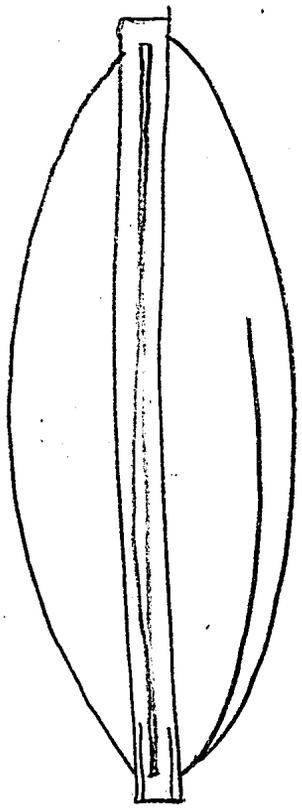
Walk out in boat holding.
Cable 30 ft from bottom

~~Coastguard~~

~~Head steamer in distance of 135 ~~[illegible]~~ Distance = nearly a mile Can hear of 2½ amp. 4 amp. Can hear of 34 = listening to Coastguard = [illegible] air pump on Repeat small machinery noise out of 18.~~

Standing Still fish on bottom 200 ft cable out and at = 4 amp. Small machinery noise heard + vibration out of 18.

Standing Still	Audion	Noise Value.
400 ft out. on bottom	4	20.
Resistance to ground		3,000,000
400 ft of cable out check 30' below surface behind boat all anything stopped.	4 amp per none 8	28



Fish lying on bottom 400' from boat.
Anchor 4 amps noise 8
Noise 28 –

Resistance to ground 5,000,000 ω
with lead weight tied to cable
10 ft from fish
Anchor value 8
Amp 4 Noise 20.

4 brass fins on brass tube placed
on cable 20' in front of fish
Anchor value 8
Amps 4 – Noise 26

Resistance to ground 21,000 ω

500 ft Cable – with brass fins on
cable 20 ft ahead of fish at 10 knots
Noise = 48 –

Detail of above brass fins
on opposite page.
Plugged hole 4 ft
over

Plugged hole in tube
500 ft. 4 amps. 44
Noticed snap every 10 or 12 seconds. preceded by a buzzing & followed by a musical note.

250 ft. 4 amps 40
snap every 20 seconds - preceded by buzz — & musical note gone.

100 ft. 0 ft. brass squid
Don't Sink.

250 ft Resistance 90,000 ω

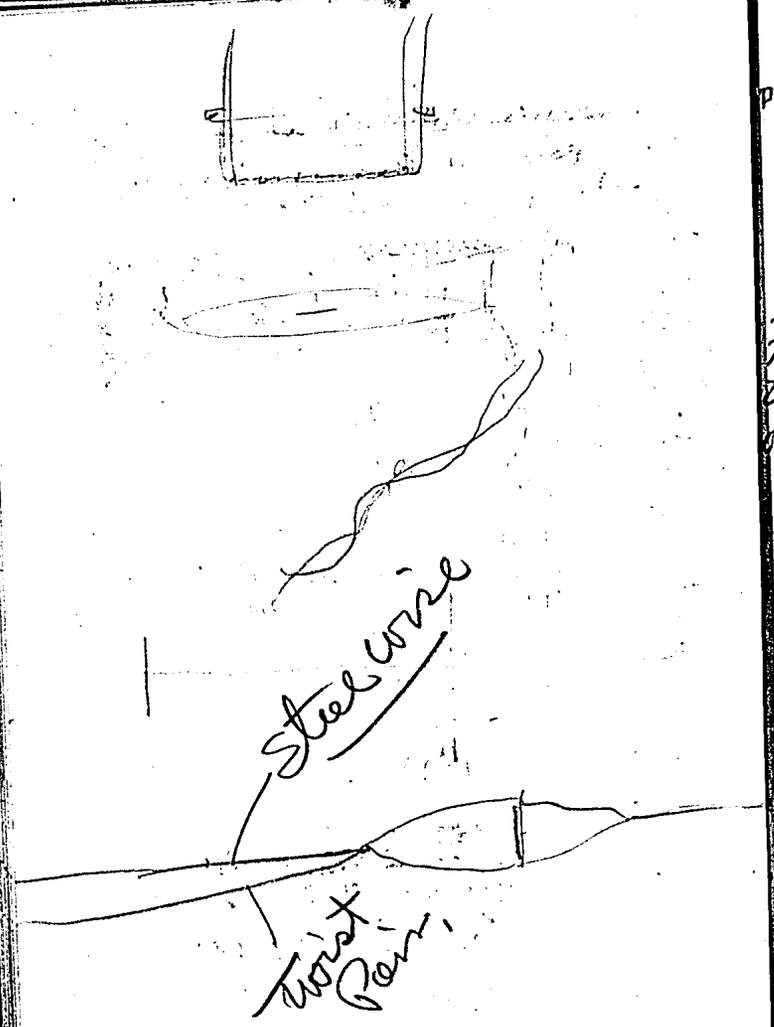
200 ft 4 amps 48
10 knot.
Resistance 30,000 ohm.

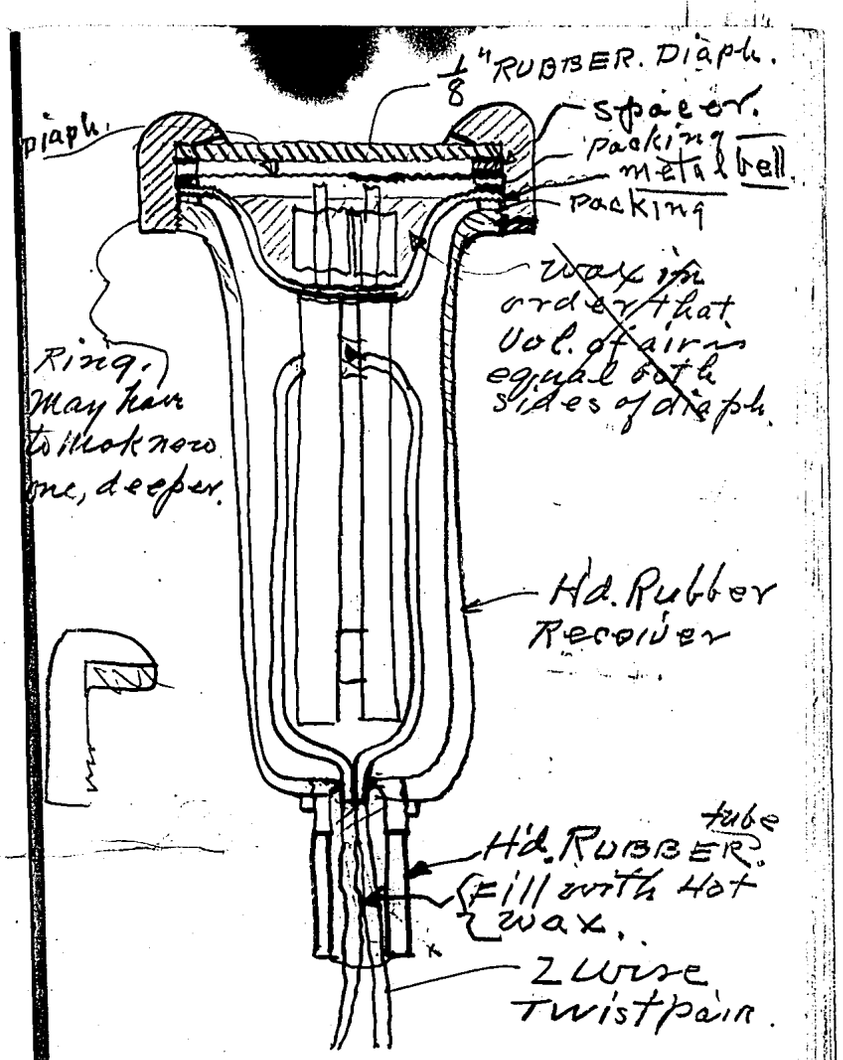
500 ft. — 4 amp. — 52

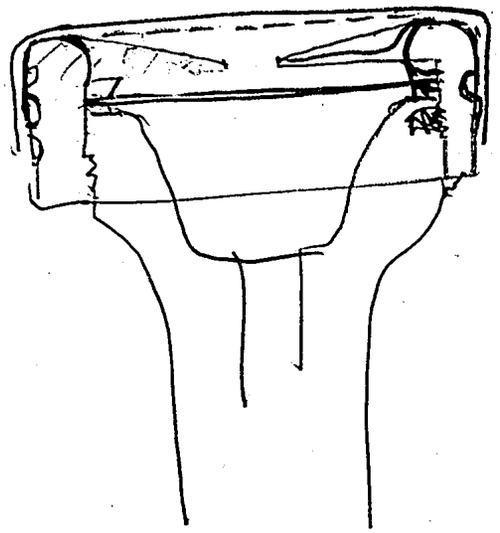
Resistance 70,000 ohm.

5 knots 4 — 56+
500 ft
Resistance 60,000

Nov 28


Steel wire
twist pair.


1/8" RUBBER. Diaph.
Spacer.
Diaph.
packing
metal bell.
packing
Wax in order that Vol. of air is equal both sides of diaph.
Ring. May have to make nero one, deeper.
Hd. Rubber Receiver
Hd. RUBBER tube
Fill with Hot wax.
2 wire Twistpair.

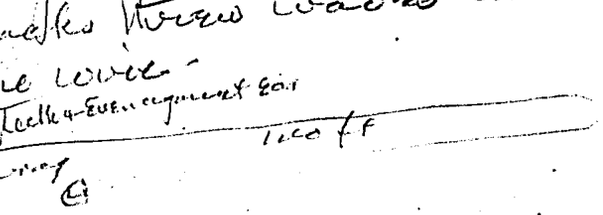


Mar 5

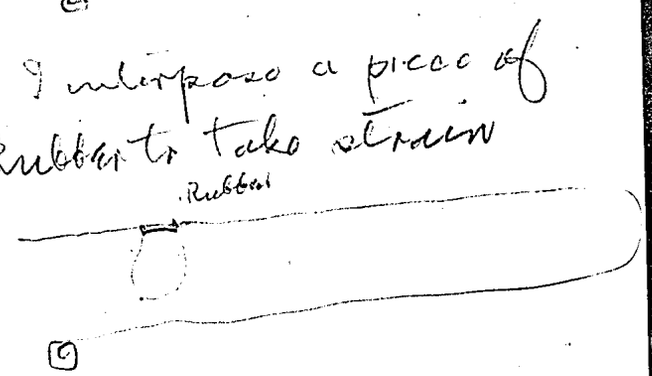
Have found that most of the noise on towing lines is due to mechanical waves on the towing lines — These waves are transmitted along the tow line by variation of water pressure & the boat partaken of the waves the dirigible picks them up & we hear them 35 to 50 on audion box at 500 ft They are slightly less at 1000 feet — If boat stops Engine & anything else but suddenly it does not damped showing its ~~[illegible]~~ not boat sounds but mechanical waves thereon on the tow line

today & laid out 100 ft of tow line on dock by placing

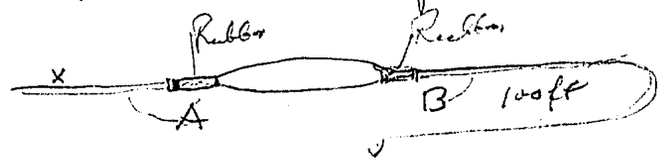
Cable in tank & dragging the 100 ft of Cable over the board & the deck the noise was fearful continuous except where rough splint on deck, then you'd a heap. In fact it acted just like a phonograph stylus worked on friction gramophone — Even rough splint on deck + cracks there were wolves wild the lower —



If I interpose a piece of Rubber to take strain



then no sound is heard in tank Wolfe roped up a fish thus



by pulling at X - the boat & 100 feet Cable dragged but no sound transmitted to tank at X yet at B the sound was terrible —

This Rubber meant kills the mechanical wolves —

In practice we can insert 2 or more of these rubber deadners in tow lines

Rubber - small
spiraled connection wire -
joints well fused no no
water gets in -
Entire strain is taken by
Rubber tubes & vibration
stopped, Rubber tubing
should be 8 @ 10 inches
long & stands 60 lbs
without breaking or collapsing

one of these units can
be put 100 ft from
fish & one within
1 ft of fish, or right
on fish -

Another Experiment
we tried was to drag
100 ft Cable over dark
to see if it electrifies
and use Condition
3 stages -
Never got 12 on the
box - (Condition 2)
This was with Cable
smooth rubber

When was substituted the twisted 2 wire Cable the noise went to 45 on box at the twists got great knocks — Therefore the Cable is Electrified by rubbing on boards —

But previous tests show on 8 on box — (11 am) with 1000 ft at 10 knots in water without fish or phone

showing that we do not need fear electrification here —

We are trying galvanic Currents now —

If two wires Connected to primary of audion + wires lowered over boat into water get no sound in audion still or moving both wires Copper also brass plate gives 14 on box

If a large plate is connected (iron galvanized) is used with 1 wire + bare wire on other no sound in audion

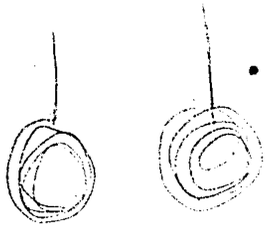
If Brass plate is used just hear 3 @ 4 faint on audion

With Iron galvanized connected to 1 wire and the boat to the other wire, got 14 on audion

this looks as if we had at boat a clean Copper plate + ditto on fish, we can use the Earth return + a single conductor Cable — this would simplify Matters.

Two Copper wires Each 3 ft long bare put in sea — no noise on audion, moving + still —

Measured the Resistance between the coils —



wires coiled up —

We find that there is a current from these coils but as it can permeate easily it doesn't make noise —

Known Dago resistance is less than 3 ohms —

Source Plume [illegible] steam Mar 21 with [illegible] 2 ft for fish.

Key West Mar 31 - 1919

Using same plume as used Mar 28 [illegible] Bolage [illegible].

Smooth 1/4" cable

Resistance [illegible] grounded [illegible] Putting the [illegible] flowed [illegible] cable and fish [illegible] small magnet [illegible] carry current [illegible] steam.

	Amperes	Volts
250 ft cable 7 knots.	4	38
Resistance 50 [illegible] ohms.		

	Amperes	Volts
500 ft Cable 10 knots.	3.4	40
Resistance [illegible] ohms		

Mr Edison made lines as follows. Wire coil shell sound [illegible] continuous steam pound peale, Steat frying [illegible] Each snap [illegible] strength, appears to be 8 to 15 per second. Big snaps now and then,

100 ft in front of fish-lodge

Rudder

5'

	American Prop	Phone Value
500 ft 10 knots	3.8	42

Resistance to propeller 700,000 dynes

500 ft of cable pulled from 30' long cable 400 ft cable 400 ft from stem

	American	Mine
500 ft 10 knots	38 amps	40 ✓
500 ft [illegible]	3.8	52

Resistance 10,000,000 dynes. ✓

100 ft cable coming from 30' boom forward of fish node plane stern Rudder on. Rubber tube connected between cable and fish. Clean ringing sound heard over phone. Amps 8 Phone

100 ft 7 knots	3.8	42

500 ft of cable out from 30' boom 400 ft behind stern

	Amps	Phone	
500 ft 10 knots	3.9 amps	36	40

Clear ringing sound like noise of screw.

With last nodes permanent magnets and engines shut down phone — 3 g

Same phone as shown in March 21 - except 20 in rubber exp joint is attached to hose of fish, + fish is air filled instead of water filled (wife)

[955]

Same phone
One Cable-hose
Disconnected.
10 knots 3.8 amps none
500 ft 50,
[illegible] 50
[illegible] noises ~~water~~
in from the plane, if possible
Noise from engines,

Procedure of Cable
Phone 5-45 hours

April 1 1918

With telephone in fish with air inside
Phone in water and used bell as
sound sound
Heard bell 115 ft
Audion amps 3.6
Used same phone as in Mar 31 Exp 1

Put telephone in water without fish
Audion amps 3.8
Heard bell 175 ft
Water shallow in which bell was used

Same between docks
20' 18' 5' = 125'

In deep water
Telephone out of fish
Audion 3.8 amps distance 375'

wire nothing Ohm
Rubber receiver
with metal plate in back
3 stage audion
Audion amps 3.6
Heard bell 105 ft

This telephone is extremely
sensitive in air
Water on one side air between
water and diaphragm - Rubber 1/32"

Removed with diaphragm
Heard bell
Audion 3.6 amps 251 ft

April 2 - 1918

80 ohm phone in water with Rubber diaphragm over a 1/32" brass plate containing 1/4" holes air between Rubber and diaphragm Heard bell 375' — Audion amperes 3.9

Removed Rubber diaphragm and brass plate — Heard bell 425' Audion amps 3.8

Installed rubber diaphragm backed by 1/32" brass plate with 1/8" holes Heard bell 375' Audion amperes 3.9

Apr 6th Res = 495000.

500 ohm Rec. Brown Case.

3.5 amps on Audion.

Heard bell. ~~3 ft water above~~

holes against diaph. 354 ft. 385

1/4" holes in diaph 1/16 thick 335 ft. 340

1/4 " " " 1/32 thick 333 ft. 335

1/8 " " Dia. 1/16 335 " 330

1/8 " " 1/32

1/16 " " 1/16 305 ft. 300.

tide running away from receiver towards source of noise

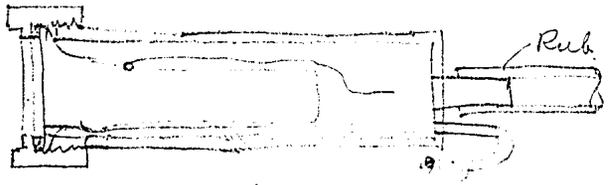
335

Rub. diaph only - no support. 254.

Still test off dock...

April 8th.

500 ohm receiver - enclosed in Brass shell, airtight, with washers.



Long rubber tube air to transistor.

Amp on audion 3.5

Look bell out in boat

Reed bell.

Water against diaph. 1225 gr.

Rub. sheet over 1/4" holes - -1215 gr.

" " " 1/16 holes 1100 gr.

The rubber sheet was backed up by a brass plate 1/8" ahead of the regular diaph.

The first one consisted of 1/4" holes drilled 1/32" apart + the 2nd 1/16" holes 1/32" apart - + thin sheet rubber stretched over these discs

There was little dif between

the water against diaph
+ when disc with 1/4" holes
was used - but quite a falling
off when the 1/16" holes were used

Wolfe

Still test off dock.

April 9 —

Took same telephone in metal case, described apr 8. + compared it with new one described by drawing "A" + which I will call new phone in this experiment —

We placed both phones on boat off dock + as weather was too rough to go out in boat we rowed boat on opposite side of dock at a constant distance + added resistance to line until ring of bell was just heard out..

Results on Audion 4.—

New phone - noises were heard out at 50
old phone " " " " at 48

New phone + 50 ft wire had resistance of 173 ohm
old phone had resistance of 516 ohm

Wolfe

There was very little difference in the ~~audibility~~ of the two phones - except the old one seemed to have a more natural tone, -

In touching the supporting strings of each cable the new one was very noisy while the old one was quiet, -

Wolfe.

Key West April 10 - 1918

On dock. -

No input wires to audion
Primary of audion connected to case
Noise value in phone 2
frying occassionally
A No ground on case
Same with primary not connected to case

75' army field cable laid on dock and connected to input
B. Noise like commutator
Noise value 10
Primary not grounded to case

75' army cable stretched 7' high along dock - Noise 28
Primary not grounded to case
C. Case not grounded
1. Case grounded, noise 36
Primary middle point connected to case value 2
Case grounded - Primary middle connected to case 2

95' Cable - 75' | 40'

End 40' high - Value 8
{ Primary not grounded Core not grounded
" " " Core grounded - 10

End 40' high
Value Primary not grounded 4
Core not grounded

Core grounded 10

Note: noise heard was very much like commutator noise, traced this to telephone cable along dock. In those cases where noise was heard, cable was near and parallel to telephone cable. When run right along side, maximum noise was obtained.

Key West April 1, 1918

A - 500 ohm phone in brass container - water against diaphragm
B - 500 ohm phone in fish with 1/8" hole in brass plate covered with 1/32" rubber

Relative Values

A	34	32	44
B	30	26	40

Key West ~~Apr~~ April 15, 1918

Two 500 ohm phones mounted in ~~brass~~ containers with water against diaphragms.
I - air compensation for pressure by means of rubber tubing
II ~~diaphragm~~ not compensated
Telephone in coffee tube in fish
Listened to noise of submarine charging. Used standard cable box to get values of noise

Depth submerged	I Noise Value	II
2 ft	42	48
10 ft	56+	36

April 16-1918

1.5 ft	Installed air tube Compensation on #II	38	40
5 ft		44	44
10 ft		52	42

with coffee tube removed value = 56+ # II phone

~~Set a~~

Key West April 17-1918

Installed rubber membrane over diaphragm on #II phone
Put phones in water #II phone not in fish. Used bell as source of sound

Noise

Ref Ck	I	II
5 ft	5-0	5-0
10 ft	5-2	5-2
with #II phone in Copper tube of fish *	46	46

* Audion amperes dropped 3.8 to 3.5

Key West April 19-1918

Phone I - 500 ω receiver in brass container water against diaphragm
" II - 1000 ω bipod receiver in fish - diaphragm parallel to force and aft line of fish - receiver in air chamber enclosed by cylindrical brass piece with 1/8" holes covered by 1/32 rubber
III 500 ω receiver in copper tube fish water against diaphragm Rubber tube preventing separating phone cone and copper tube
IV 500 ohm receiver in air chamber enclosed by rubber sheet stretched over circular brass plate containing holes. 1/8"

Resistance to ground

Resistance to ground #II = 1,000,000 ω
5 ft of Cable in water

#I = 120,000+
#III - 17,500
#IV - 500,000

Bell in boat out about 300 ft. used standard cattle boxes to compare values.

		Noise of bell
Number I	phone	42
" II	"	4
" III	"	42
" IV	"	42

formed lead on #2 open
Repeated test boat about 300 feet away

		Noise Value
Number I	phone	44
II	"	40
III	"	40
IV	"	44

Sly West Jan 21-1911

On board [illegible]
500 ft of cattle - 1000 ohm head phone
receiver in fish II Mr. Edison Noise 20
7 knots. Audion amp 4 56+
Resistance to ground [illegible] ohms.
Audion [illegible] to bell [illegible]
Cattle held at 20 [illegible]

500 ft cattle 500 ohm phone # III
7 knots Noise 34
10 knots " 54
Resistance, 10,000,000 ohm +
Note the body on the fish is solid. Very good conduction of sound,

500 ft Cattle 500 ohm phone # IV
7 knots Noise 56+ W.K.
7 knots (Mr. Edison " 10
Resistance to ground 500,000 ohms.

250 ft cattle phone IV
7 knots Noise 56+ W.K.
Mr. Edison " 12

1000 ft cattle phone IV
7 knots held cattle close to boat

C113

None - load broke head in place - None correct, checked resistance of circuit 90,000 Ω
Hauled cable in and found fish gone
rubber line head parted

#III - Put bullet tail on,
no fins.
250 ft. line, load depths
at equator intervals about 110 fm
minute

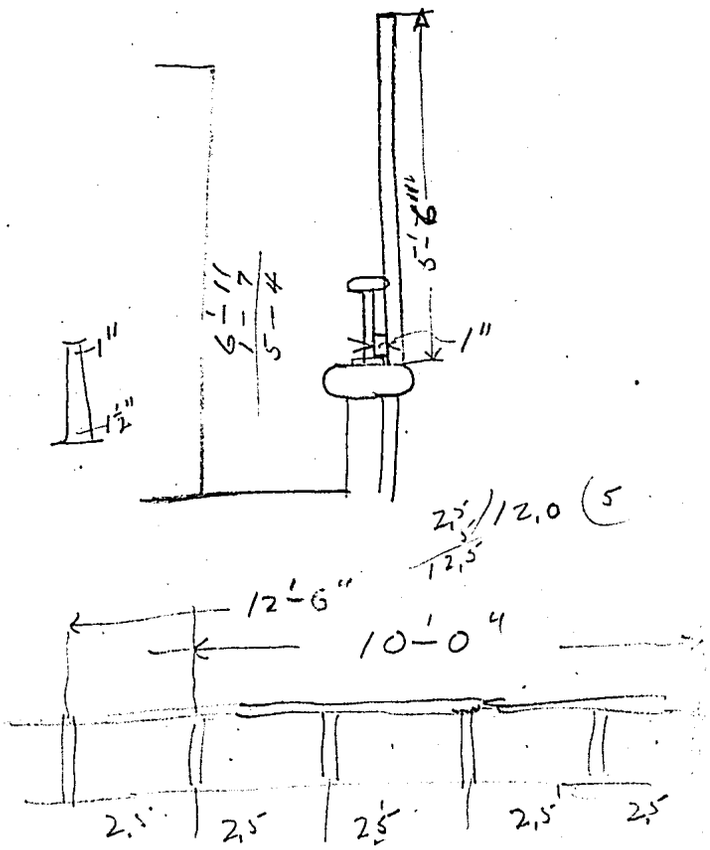
at 500 ft head opens brackets
less fins removed.

Key West April 23-1915

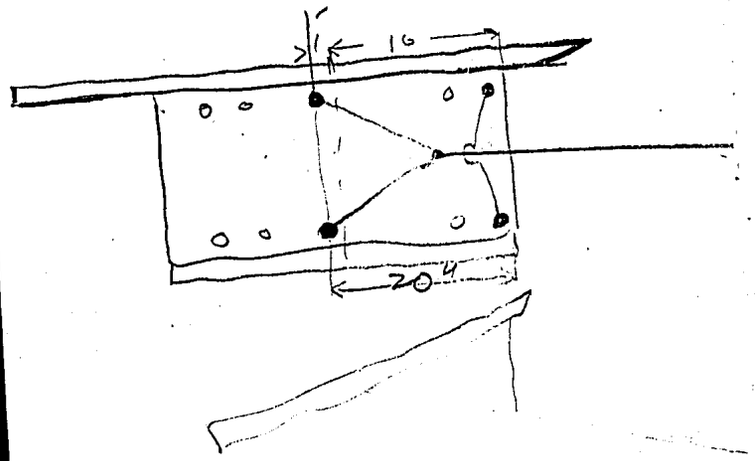
#III Shunt 500 ohm - with bullet tail and fins
Pulled from 30' boom near 1000
95 ft of cable
None

24

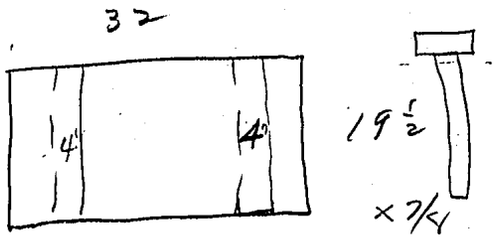
Resistance to ground 20,000 ohms,
Dismantled bulkhead and found some
insulation due to deflection not being
properly centered?



10 ft


16
20 4

32



19.5
32
390
585
624.0
152
776.

19
19
38
2
152

100
12.5
87.5

87.5
3880
5432
6208
679.20.0

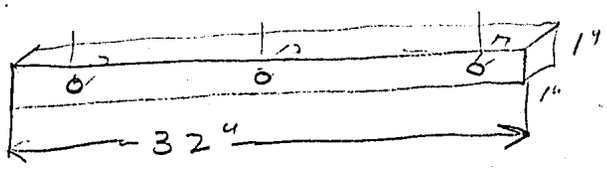
17.25) 680.00 in (.40
68.00

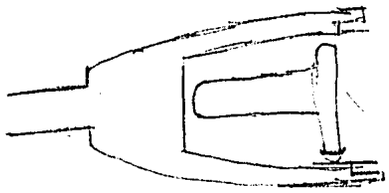
.4 cu ft wood

~~62.5~~
64
40. spg volume
24.
.4
9.6

10 #
7/60
.28 4
.28/3) 8.75 # (30 cu in

(1" □ × 30" lg.)





1.25

~~57.3~~ 60 × 5.75

~~46~~

46 | 57.3 | 125

46

113

92

210

5.75

95

2875

4025

43025

425

52¢ 30¢ − 30¢ = 52¢

1° 8¢ − 30

52

57.3 × 60 =

1.1

~~57.3~~ × 60

~~52~~

× 5.75

66

3450

3450

379.50

294

85

57.3 × 60 × 5.75

6730

52

67 × 379 | 566

335 | 52

440 | 1132

402 | 1830

380 | 294

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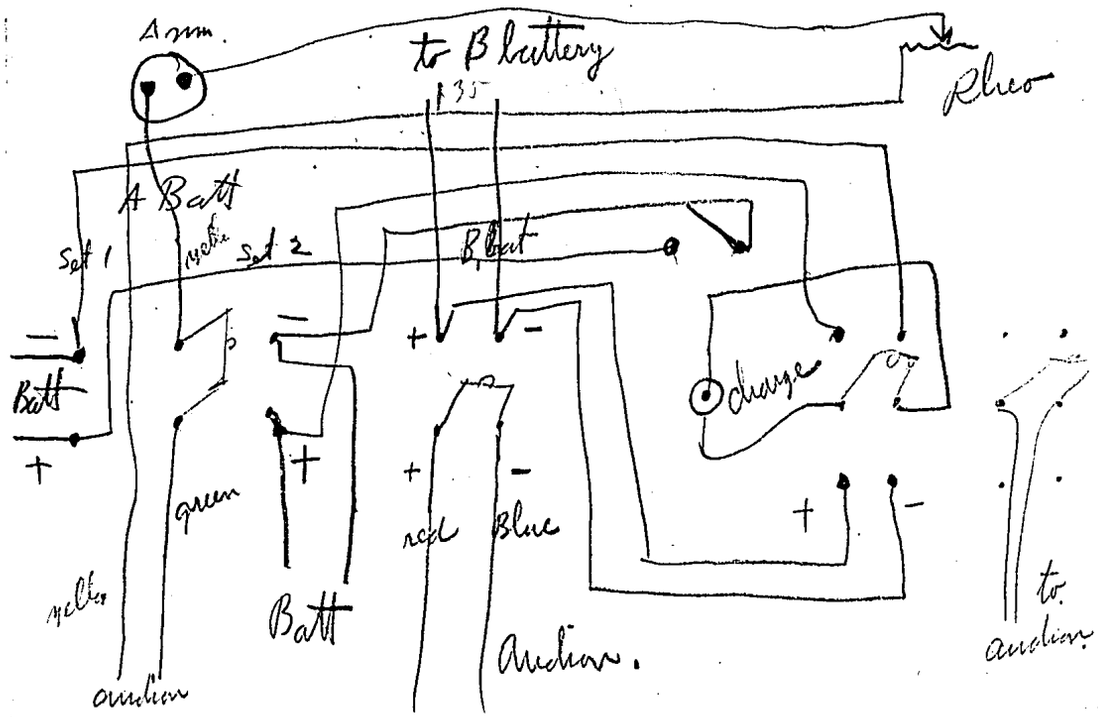

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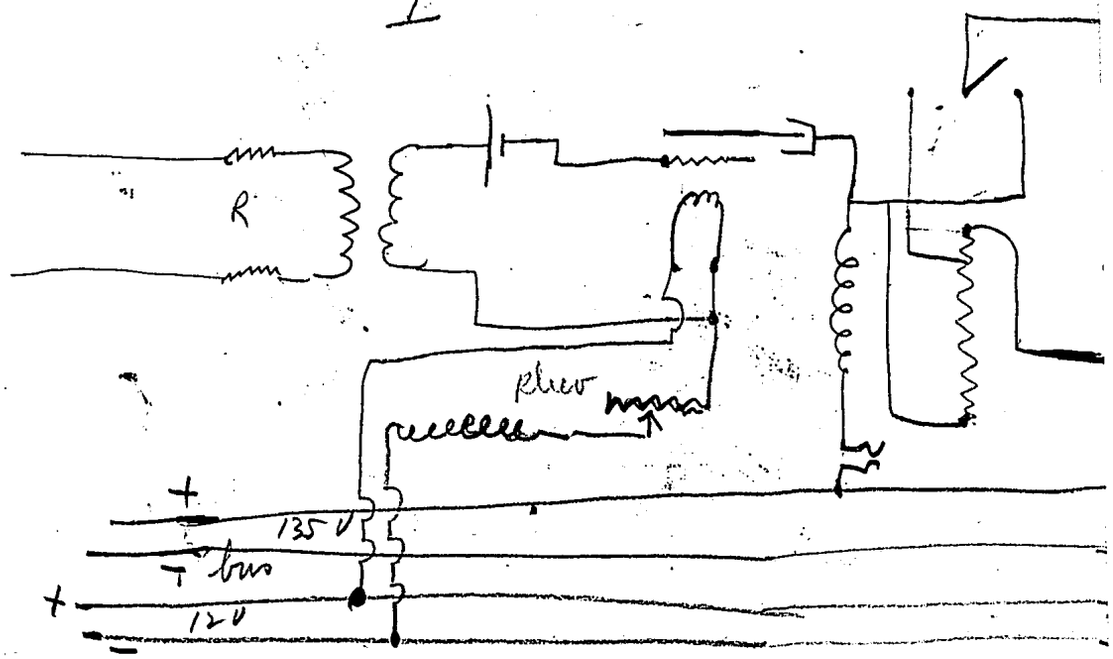

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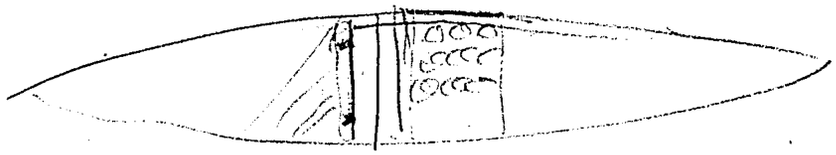
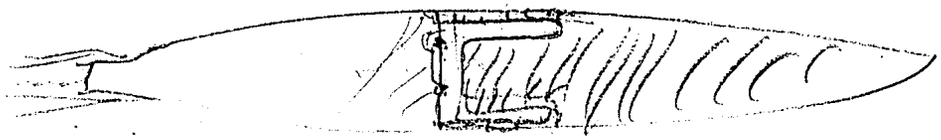
Key West
April 1-1918

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